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Characters of some new HEPATICÆ (mostly North American), together with Notes on a few imperfectly described Species.

BY COE F. AUSTIN.

Scapania Peckii, Aust.

S. minuta, compacte cæspitosa, valde surculosa; caule subsimplici serpentino-erecto vel adscendente 3—4 lin. longo sursum accrescenti laxe vel subimbricante foliato; foliis integerrimis obtuse complicatis bilobis, lobis subconformibus late ovatis plerumque obtusis apiculatisque, dorsali parce minori; surculis sursum subdecrescentibus dissite foliatis, foliis subdifformibus acute bilobis varie modo directis complicatisque suberectis vel plerumque e basi erecto patulo-recurvis nonnullis interdum explanatis; perianthio parvo subcuneato terminali et laterali sessili valde compresso, ore truncato integerrimo sæpe subrecurvo; foliis involucralibus conformibus nonnullo subdenticulatis; rete foliorum e cellulis minutis subrotundis hyalinis poriformibus, intersticiis latissimis fulgido-pellucidis confluentibus instructo.—*Hep. Bor. Amer. Exsic. ined., No.* 20.

On old logs in woods, near Belleville, Canada West, John Macoun (1865). Adirondack Mountains, New York, Prof. C. H. Peck (1867); also about Jordansville, N. Y. (Austin, 1868).

Remarkable for its minute size (being about the size of *Jungermannia Hellerana*), obtusely complicate leaves with the upper lobe sometimes small and tooth-like, at other times nearly equalling the lower one; and for the great number of surculi, which are extremely variable in size, and clothed with smallish leaves, which resemble very much those of *Jungermannia Hellerana*, or *J. minuta*, and are very different from those of the main stems. The gemmæ bearing leaves occupy the middle of the stem, which is interrupted on account of them; they are usually ovate, subentire and subtruncate at the apex, and closely wrapped about the stem.

Resembles small forms of *S. excecta* (Schmid.), but is readily distinguished by its compressed perianth, never tridentate leaves, &c.

S. brevicaulis, Tayl., with which it may be possible to confound our species, is larger, with much more condensed stems and vertical leaves, and is destitute of surculi. Moreover, the perianth is very different, being scarcely more compressed than in *S. obtusifolia*.

Scapania Bolanderi, Aust. Mst. 1865.

S. caule subdichotomo-ramoso cæspitoso subadscendente; foliis acute complicatis grosse ciliato- vel subincise-dentatis siccate non mutantibus, lobo

ventrali valde convexo oblique obovato-oblongo valde obtuso patenti-decurvo, dorsali dimidio ~~minori~~ haud angustiori minus convexo erecto-subverticali vel subappresso orbiculato vel late ovato, apice subacuto grossius dentato leniter incurvo, margine externa ad basin longe producta ciliis valde longioribus subdecompositis deflexis ornata; perianthio compresso oblongo terminali, ore subciliato.—*Hep. Bor. Amer. Exsic. ined.*, *No.* 19.

On Redwood trees and stumps, California, Dr. H. N. Bolander..

Remarkable for the long, deflexed, often compound ciliæ on the attenuated outer basal angle of the dorsal lobe of the leaf, and for the leaves retaining their position and shape in drying. Resembles *S. nemorosa* in general appearance, but is rather smaller than the ordinary forms of that species, with longer and narrower, more obovate, and much more coarsely-toothed leaves.

Jungermannia rigida, Aust.

J. examphigastriata, subrobusta; caule decumbente flexuoso rigido nudo ex apice prolifero; foliis sursum increscentibus erecto-conniventibus arcte imbricatis oblique cordato-orbiculatis rotundatis integerrimis, margine flexuoso-undulatis præcipue dorsali subsinuatis ventrali inflexis; perianthio terminali mox laterali obovato-oblongo plurimum plicato demum versus basin nudo, ore ciliato; involucri foliis ciliatis.

Sandwich Islands. Communicated by Dr. H. N. Bolander, 1865.

Differs from *J. flexicaulis*, Nees., Syn. Hep. p. 87, in the undulate leaves —those of the involucre ciliate, and in the multi-plicate perianth.

J. colorata, Lehm., Syn. Hep., p. 86, differs in the leaves being more connivent and orbicular, smaller, and not undulate, &c.

J. grandiflora, L. & G., Syn. Hep., p. 673, differs in its small subtrifid involucral leaves, connate with the amphigastria.

Jungermannia robusta, Aust.

J. examphigastriata; caule stricto vel subarcuato erecto ex apice prolifero-continuo e ventre toto longitudine radiculoso; foliis pallidis exacte verticalibus late oblique cordato-ovatis rotundatis, toto margine minutissime eroso-dentatis dorsali undulatis subsinuatis subdecurrentibus; perianthio terminali subcylindrico triangulari-subcompresso basi nud ore plicato subciliato; involucri foliis subbilobis, lobo ventrali subciliato denticulato, altero integro.

Sandwich Islands. Communicated by Dr. H. N. Bolander, 1865.

Differs from *J. rigida* in its pale color, much larger size, more vertical leaves eroded-dentate on the margin, in its bilobed involucral leaves, longer and less plicated perianth, and radiculose stems.

J colorata, a closely related species, is smaller, with more orbicular and connivent, reddish leaves not undulate on the dorsal margin.

Jungermannia coriacea, Aust.

J. caule repente vel adscendente subramoso radiculoso; foliis subcoriaceis rigidis arcte imbricatis madefactis patulis siccatis subverticalibus ovato-oblongis obtusis planiusculis, margine subrepandis integerrimis dorsali subdecurrentibus; perianthio magno cylindrico-oblongo sublævi, ore subplicato minute ciliato; foliis involucralibus subbilobis inciso-dentatis, basi ventrali minute lobulatis, cum stipulis parcis lanceolatis vel oblongis acute bi-quadrifidis intermixtis.

Sandwich Islands. Communicated by Dr. H. N. Bolander, 1865.

Remarkable for its large size, and for the thick epidermis of the leaves, which are of a reddish color.

Differs from *J. grandiflora*, L. & G., Syn. Hep., p. 673, in its oblong leaves, those of the involucre slightly enlarged and not connate with the amphigastria; also in the radiculose stem. There are no amphigastria except at or near the base of the perianth, and these (about four in number) are situated on

at least two sides of the stem, and some of them below the two outer involucral leaves, which are simply retuse at the apex and nearly entire, while the two inner ones are unequally bilobed and lacerate toothed.

JUNGERMANNIA BIFORMIS, Aust.

J. caulo dense cæspitoso valde intricato e ventre innovante pluries ramoso, valde radiculoso, radiculis tenui-simis longissimis subfasciculatis supremis nonnullo rubris; foliis succubis vix imbricatis subcomplanatis oblique semicircularibus vel late ovatis tenuibus, margine dorsali decurrentibus apice integris retusisve, rete e cellulis magnis subrotundis hyalinis intersticiis angustissimis instructo, surculorum foliis dimidio minoribus ovatis obovatisve valde obtusis vix decurrentibus; amphigastriis nullis; fructu ignoto.—*Hep. Bor. Amer. Exsic. ined., No.* 26.

On wet rocks, at the Delaware Water Gap, New Jersey, 1867.

Remarkable for the closely entangled and matted stems and surculi, and for the leaves of two forms. The texture of the leaves is much as in *Calypogeia Trichomanis*.

JUNGERMANNIA POSSOMBRONIOIDES, Aust.

J. caulo dense cæspitoso adscendente (radicibus purpureis subinerassatis) valde radiculoso; foliis disticho-subverticalibus arcte imbricatis orbiculatis, margine undulato-repandis, apice brevi uniplicatis leniter emarginatis patulo-subrecurvis, basi subcordatis caulem amplectentibus subventricosis radiculosis, involucralibus conformibus cum perianthio alte connatis; perianthio maximo longiuscule exserto subcampanulato sex—decemplicato, ore hiante profunde laciniato, laciniis integerrimis; calyptra omnino violacea; capsula ovali.—*Hep. Bor. Amer Exsic ined., No.* 32.

On rocks along a rivulet, near Closter, New Jersey.

Remarkable for its large, subcampanulate and multi-plicate perianth. Allied to *J. crenulata*, Smith, but much larger, &c.

JUNGERMANNIA PORPHYZOLEUCA, Nees, var.

Caule dense lateque cæspitoso prostrato innovante ramoso crassiusculo valde radiculoso, radiculis ad cauli insertionem rubris longissimis subfasciculatis; foliis plerumque rubris pallido-viride plus minus variegatis subverticalibus obtusissime subcomplicatis e basi erecta subrecurvis oblongo-quadratis subcuneatisve emarginato-bilobis integerrimis, sinu obtuso, lobis plerumque acutis subinæqualibus incurvis; perianthio adscendente subclavato valde exserto a tergo ventreque subappresso apice obtuse 3—4-plicato ore connivente subciliato; foliis involucralibus parce majoribus, apice subtruncato obtuse 3—4 lobulato et eodemque numero late plicato; caule gemmifero spiciformi attenuato rigido microphyllo, foliis bifariis arcte imbricatis subovatis apice emarginatis eroso-dentatis subintegerrimisve, gemmis rubris.—*Hep. Bor. Amer. Exsic. ined., No.* 42.

On old logs in the region of the White Mountains of New Hampshire, Oakes; also in Canada West, near Belleville, Macoun.

Remarkable for the usually variegated, often deep red color of the whole plant, and for the cuneate-oblong shape of the leaves. Differs from *J. Michauxii*, Web., in its usually smaller size, reddish color, prostrate and densely radiculose stems, longer, narrower, subcuneate and vertical leaves, with an obtuse and broad sinus, and shorter, less acute and less incurved lobes, and in the obtusely 3—4-lobed, somewhat enlarged involucral leaves; also in the gemmiferous stems, which are almost precisely as in *J. Helleriana*, Nees.

JUNGERMANNIA POLITA, Nees.

J. amphigastriis nullis; caule subsimplici nudiusculo nigrescente flexuoso, adscendente et fertili dissite repente imbricante foliato; foliis nitidis ad

caulem oblique insertis undulatis flexuoso-patulis late amplexicaulibus (vix complicatis) late cuneato-quadratis integerrimis truncato bi—trilobis, margine obtuse 1—3 undulato-plicatis (basi media vix saccatis); fructu terminali (in auctumno matur.), perianthio valde elongato (circa 3 lin. longo) subcylindrico nudo apice subplicato ore minute ciliato; foliis involucralibus binis latissimis brevissimis valde cristato-undulatis obtusissime plurimum lobulatis. —*Hep. Bor. Amer. Exsic.*, No. 46.

In a peat bog near Closter, New Jersey; growing among *Sphagna*, and associated with *J. Taylori*, *J. inflata*, *J. connivens*, etc.

The sterile plant agrees perfectly with authentic European specimens. The fruit appears to have been collected now for the first time, and is extremely rare in our locality. The leaves on the horizontal and fertile stems are crisped and wavy, much as in most *Fossombronia*. The former often bear little balls of green gemmæ on the apices of their lobes, and are subhorizontal and frequently imbricated, while the latter, *towards the perianth*, are usually 1—3 lines apart, subopposite and erect. The leaves, particularly on the erect stems, are about as often two as three lobed, and can hardly be said to be complicate, or either saccate at the base. The stem is usually very conspicuous on account of its blackish color. The perianth is whitish or membranaceous above, and at first subtriquetrous.

Jungermannia Wallrothiana, Nees.

"Nigricans, minutissima. Caule repente, adscendente, subsimplici vel innovante ramoso, vix ½—1 linea longo, valde radiculoso; radicibus crassis papilliformibusque. Foliis diametro caulis latioribus, amplectentibus, firmis, ovato-quadratis, arcte imbricatis, semiverticalibus, concavis, sursum conniventibus, emarginato-bidentatis; sinu vel obtuso in foliis inferioribus, vel acuto in foliis superioribus; dentibus obtusiusculis integerrimis; margine pellucidis; areolatione distincta, cellulis ovato-polygonis, olivaceis, margine tantum pellucidis. Foliis involucralibus majoribus, erectis, tridentatis, undato-plicatis, basi connatis; dentibus acutis vel obtusis. Perianthio ovali-cylindrico, superne contracto, plicato; ore subdentato, pellucido, inferne rubello." (Lesqx. in Herb.)

On coarse sand, on the slopes of the White Mountains of New Hampshire, Oakes.

A very minute species, but more than twice the size of *J. Sullivantii*, from which it is also distinguished by its entire leaves, papilliform rootlets, and different perianth. Leaves round-ovate, thickish, ½-bifid, the lobes triangular-ovate, acute; cellules irregularly angled, subquadrate or oval, rather uniform, largish for the size of the leaf (about ten across its widest part), opaque, with broad hyaline spaces between. Apex of the lobes hyaline, often slightly eroded on the margin. Color dark or olive-brown. Perianth terminal, subpyramidal, cleft about one-third way into about six sublinear truncate lobes, the apex white and pellucid, the middle and base dark brownish-red; the mouth crenulate by the protrusion of the ends of the very large, oblong cells, of which the upper portion of the perianth is composed. Leaves of the involucre enlarged, entire on the margin.

Jungermannia Sullivantii, Aust.

J. amphigastriata, minutissima, olivaceo-vel saturate viridis; caule circa ½—½ lin. longo carnoso valde radiculoso, fructifero suberecto clavato, sterili repente subfiliformi vel subjulaceo; foliis imbricatis caule sæpe angustioribus ovato-orbiculatis vel subquadratis erecto-subverticalibus plus minus dentato-serratis bifidis, sinu acutiusculo, dentibus acutis; amphigastris (solum versus apicem in caule sterili observatis) lanceolato-ovatis strictis integris (folii lobo fere similibus) suberectis; perianthio circa ½ linea longo late ovali subobovatove obtuse parceque angulato, apice paulum plicato truncato,

ined.

Not J. Wallrothiana Nees
a var. of J. Sivalicata or a
closely related species. CA.

ore connivente lobulato-dentato nonnullo auguste scarioso; involucri foliis tribus erectis haud coalitis; pedicello longitudine semilineari; capsula ovali. —*Hep. Bor. Amer. Exsic. ined., No.* 50.

J. divaricata, Sulliv., Musc. Alleghan. N. 239.

On very rotten wood near Columbus, Ohio, Sullivant. About Closter, New Jersey, and Jordansville, New York. Also near Belleville, Canada West, Macoun.

Remarkable for its extremely minute size. Differs from *J. divaricata*, Engl. Bot., in the much smaller size of the whole plant, particularly the perianth, in the larger, sublanceolate amphigastria, in the discrete involucral leaves, and in the roundish, less quadrate and less angular cells of the leaves.

JUNGERMANNIA MACOUNII, Aust.

J. caule compacte lateque cæspitoso tenui valde innovante ramuloso, ramulo fructifero brevissimo ventrali; foliis caule latioribus subimbricatis erecto-subverticalibus subcomplicato-concavis e basi angustiori subcuneato-quadratis ultra medium bifidis, sinu plerumque lato obtuso, laciniis triangulari-lanceolatis vel subulatis rectiusculis sub pressura divaricatis, areolis parviusculis angularibus; perianthio minuto albido subtrigono ovali-obovato gibbositate subinflato, apice contracto subplicato, ore denticulato ciliatove; involucri foliis subovatis subinæqualiter bi-trifidis serratis longe ciliatisve.—*Hep. Bor. Amer. Exsic. ined., No.* 55.

On decayed logs in woods, Canada West, John Macoun.

Differs from *J. divaricata* in the more matted stems, in the rather wider, more complicate leaves with an obtuse sinus; and chiefly in the much shorter, white, and differently shaped perianth, which is situated on a short ventral branch. The habitat (old logs) is also different. Color very dark green, changing to dark fuscous- or brownish-green in the herbarium. Perianth shaped much as in *J. Helleriana*, Nees.

JUNGERMANNIA PLENICEPS, Aust.

J. caule dense cæspitoso perbrevi e ventre valde radiculoso innovanteque ramoso; foliis incrassatis orbiculatis valde concavis verticali-conniventibus subsemiamplexicaulibus ad ⅓ bifidis, sinu acutiusculo obtusove, lobis ommino acutis incurvis valde conniventibus; fructu in ramulo ventrali terminali, perianthiis confertissimis magnis oblongo-cylindricis obtuse trigonis, ore plicato denticulato hinc laciniato; involucri foliis rectis oblongis bi palmato-quadrifidis nonnullis stipuloideis; rete foliorum e cellulis amplissimis subrotundis hyalinis instructo.

Among Sphagna, White Mountains of New Hampshire, Oakes.

Remarkable for the very concave, upwardly connivent and thick leaves, which are composed of very large inflated cellules; for the very short stems with numerous ventral innovations, and for the very abundant fruit,—the perianths completely covering the *cæspites*. Color pale or albescent. (Some of the involucral leaves (the ventral ones) are amphigastria-like. Resembles *J. connivens*, Dicks., but is somewhat larger, with shorter stems, more vertical and concave and thicker leaves, *which are not decurrent*, and a larger more cylindrical perianth, which is not ciliate at the mouth. Perianth much as in *J. bicuspidata*, but the shape of the leaves is quite different from the specimens of that species collected by Oakes, in precisely similar situations; the stems are also shorter and the involucral leaves not spreading at the apex.

LOPHOCOLEA HALLII, Aust.

L. caule repente parcissime radiculoso; foliis subverticalibus oblongis integris vel subrepandis crenulatis fere ad medium bilobis, sinu obtuso, laciniis subrectis plerumque obtusis, rete e cellulis subparvis rotundis convexis hyalinis, intersticiis angustissimis instructo; amphigastriis inferioribus parvis profunde bipartitis, sinu valde obtuso, laciniis subæqualibus terretiusculis patulis in-

curvis, superioribus majoribus extrorsum utrinque unidentatis vel palmato tri-quadripartitis, apicalibus sublanceolatis anguste bifidis extrorsum repando-dentatis; fructu ——.

On the ground, Illinois, E. Hall.

Remarkable for the obtusish lobes and crenulate margin of the leaves. A very small species.

LOPHOCOLEA MACOUNII, Aust.

L. minutula, condensata, læte viridis; caule perbrevi prostrato dense fasciculatim radiculoso innovante ramoso ad apicem adscendentem incurviusculo; foliis erectiusculis ovato-subquadratis retusis vel emarginato-bilobis aut sæpe integris margine leniter repanda crenulatis, sinu lobisque obtusis vel acutiusculis his rectis vel curviusculis, rete e cellulis magnis intersticiis angustissimis hyalinis instructo; amphigastriis profunde bifidis (trifidisve?) sinu lato obtuso, laciniis serie cellularum 1—2 instructis filiformibus patulo incurvis, colore læte caryophylloideis; perianthio subobovato leniter trigono, apice cristato-dentato sæpe in uno latere profunde obtuseque inciso, angulis haud vel vix alatis; involucri foliis majoribus suboblongis subrepandis apice valde inæqualiter 2—4 repando-dentatis; amphigastriis valde majoribus lanceolatis minus profunde bifidis repando-dentatis.—*Hep. Bor. Amer. Exsic. ined., No.* 66.

On old logs in woods, hidden among other *Jungermanniæ*, Canada, Macoun; also near Little Falls, New York.

About the size and with much the general appearance (when sterile) of small forms of *Jungermannia scutata*, resembling it in the color, general form, position, and in the areolation of the leaves. Remarkable, among other things, for the light pink color of the amphigastria, with thread- or necklace-form divisions (usually composed of a single row of cells.) Differs from the preceding species in its much smaller size, densely radiculose stems, shorter and less deeply lobed leaves, &c.; and from *L. minor*, Nees., in the more obtusely lobed, often entire leaves. The lower leaves are usually rather deeply and acutely lobed, while the upper ones are only emarginate or retuse, or often quite entire at the apex.

? GYMNANTHE BOLANDERI, Aust.

?G. caule eradiculoso prostrato subimbricato e ventre innovante ramoso complanate foliato ½—¾ unciali; foliis succubis stricte patentibus linear-oblongis subfalcatis integerrimis planis, apice rotundatis vel oblique subtruncatis aut nonnullo inæqualiter emarginato-bilobis, margine dorsali subdecurrentibus; rete e cellulis laxis maximis heteromorphis discretis, intersticiis latis hyalinis instructo: amphigastriis (inferne obsoletis) minutis oblongo-ovatis longe bicornibus, sinu obtuso, laciniis subulatis paralellis; fructu ——.

Sandwich Islands. Communicated by Dr. H. N. Bolander, (1865.)

A neat and pretty little plant, about the size of *Lejeunia serpyllifolia;* the form of the leaves suggesting a *Plagiochila*, but the general appearance of the plant is still more suggestive of a *Saccogyna*, and, indeed, I am not sure but that it ought rather to have been referred to this latter genus than to GYMNANTHE. The cells of the leaves are very large and loosely arranged, and are usually furnished with broad and short projecting points. They also vary greatly in size and position, being roundish or oblong, and frequently some of them are obliquely or even transversely disposed through the leaf. Those on the margin are usually narrower than the others, and vary from subquadrate to elongated-oblong or parallelogrammoid. The cells of the stem are also very loosely disposed; however, they are still larger than the leaf-cells, and uniformly oblong.

CALYPOGEIA BIFURCA, Aust.

C. albida, cæspitosa, parvula; caule prostrato e ventre apiceque valde flagellifero-ramoso circa 3—5 lin. longo, dorso in statu siccato convexo (nec canaliculato) ob cellulis oblongis eleganter striolato perspicue secus foliorum

basin cellulis maximis oblongis hyalinis marginato; foliis imbricatis late et suboblique ovatis margine inferiori abrupte decurrentibus supra valde convexis siccate non mutatis apice pro genere lato subcontractis emarginato-bidentatis, dentibus triangulari-subulatis rectis vel plerumque divaricatis, sinu plerumque lunulato; rete e cellulis hexagonis magnis hyalinis, versus basin oblongis, versus apicem rotundatis ac sensim minoribus, secus marginem angustioribus plus minus quadrangularibus transversimque elongatis instructo; amphigastriis valde dissitis minutis caule angustioribus vel cum vix excedentibus ovatis vel reniformi-rotundis obtuse profundeque bifidis, lacinilis rectis subulatis integrisque vel subrotundis divaricatis iterum bifidis.

Sandwich Islands. Communicated by Dr. H. N. Bolander, (1865.)

A neat and pretty little species. Possibly too near the Mexican *C. laza, L. & G., Syn. Hep. p.* 713, but nothing is there said about the flagiliferous ramification, a striking feature of our plant; and the leaves are said to be lax and *minutely* bidentate, characters which do not agree with our plant, whose leaves do not change their shape in drying, and, for the genus, are pretty strongly toothed. The peculiar bifurcation of most of the amphigastria, and the transverse elongation of the marginal cells of the leaf, appear to be generic characters (specific only in degree), as they occur (in a less degree) in *C. Trichomanis*, and at least in two other species.

Physiotium subinflatum, Aust.

Ph. foliorum lobulis subinæqualibus lanceolatis acuminatis circa ½—⅔ liberis; dorsali convexo, margine exteriori versus basin inflexo subbidenticulatoque, apice subconvoluto dentibus parvis rectis acutis minute bifido; ventrali parce minori convoluto-concavo, basi ob margines coalescentes breviter tubuloso non appendiculato, margine interiori subalato, ad apicem angustum sublingulato obtusiusculo integro et integerrimo vel eroso-denticulato.

Sandwich Islands. Communicated by Dr. H. N. Bolander, (1865.)

Remarkable for the subequal acuminate lobes of the leaf; the lower one not appendiculate, and inflated only at the base, convolute-concave above.

Polytotus Peckianus, Aust.

P. caule repente pinnatim vel bi—tripinnatim ramoso, ramulis dissitiusculis patulo-recurvis ½—¾-uncialibus subattenuatis; foliis arctissime imbricatis subovatis obliquis convoluto-decurvis inæqualiter bi—trilobis integerrimis basi utrinque auriculatis, sinu angusto, lobis ovatis acutis vel subapiculatis aut rare obtusis inferioribus incurvis; auriculis subparvis oblongo-lanceolatis canaliculato-concavis, ventralibus stricte patentibus caulem arcte amplectentibus, dorsalibus plus minus deflexis cauli arcte appressis; amphigastriis maximis oblongis profundius et æqualiter bifidis, basi ut in foliis auriculatis, auriculis caulem utrobique arcte amplectentibus; fructu in ramulo brevi polyphyllo; involucri foliis valde majoribus oblongis basi parce longissimeque ciliato-lobulatis profunde bifidis, lacinilis ligulatis undulatis subdentatis canaliculatis.

Island of Mauritius. Communicated by Prof. C. H. Peck, (1868).

Remarkable for the bi—trilobed leaves, and for the very large bifid amphigastria, which are auricled at the base in much the same manner as are the leaves. The stems are about 2½ inches long and rather widely branched. The leaves do not change their shape in drying. In size the plant rather exceeds *Frullania Tamarisci.*

Sendtnera tristicha, Aust.

S. parvula, rufo-brunnea vel subnigra; caule rigido parce ramoso tenui subunciali; foliis amphigastriisque exacte tristichis ovato-lanceolatis falcato-subsecundis apertis vel siccatis appressis apice ad ⅓ partem fissis, lobis acutissimis inæqualibus recto-conniventibus; fructu ———.

Sandwich Islands. Communicated by Dr. H. N. Bolander, (1865).

Differs from *S. fissa*, Nees, in the leaves being much less deeply fissured at the apex.

PHRAGMICOMA ELONGATA, Aust.

Ph. caule stricto parce innovante diviso subbiunciali; foliis late subfalcato-ovatis convexis patulo-recurvis et decurvis fere linea longis apice serratis subacutis vel obtusis, lobulo minuto subinflato mutico in folii margine transeunte; amphigastriis squarrosis caulí duplo latioribus orbiculatis subreniformibusve subtus concavis, margine omnino minutissime serratis; perianthio parvo a lateribus compresso fere sessili subdecem-alato cæteroquin lævi.

Sandwich Islands. Communicated by Dr. H. N. Bolander, (1865).

A large species, being about the size of *P. semirepronda*, Herb. Lehm., but the leaves are less strongly toothed, and the perianth more numerously angled, the angles winged, &c.

PHRAGMICOMA SUBSQUARROSA, Aust.

Ph. caule brevi flexuoso compacte cæspitoso rigido apice suberecto; foliis arctissime imbricatis in siccis subsquarrosis undulatisque obovato-rotundis maxime areolatis, lobulo majusculo semirotundo-ovato vix inflato; amphigastriis caule duplo vel triplo latioribus reniformibus apice subrecurvis; perianthio obovato haud compresso circa 10-alato cæteroquin lævi.

Sandwich Islands. Communicated by Dr. H. N. Bolander, (1865).

Perianth terminal, at length lateral, deeply and closely grooved or angled, crowned with a very minute cylindrical tube. Calyptra crowned with a very long style. Elaters very large, containing a [redacted] thick, imperfect fibre. Leaves margined by a row of diminished, subequal cellules.

? LEJEUNIA SISSEIATA, Aust.

? L. foliis rufo vel fusco-brunneis siccatis convoluto-adpressis madefactis patentibus oblongo-ovatis integris convexis, supra minute eleganterque papillosis, toto margine inferiori late inflexis; amphigastriis biseriatis alternatis foliorum medio oppositis basi ad caulem exacte diagone insertis erecto-divaricatis lineari-oblongis obtusis [redacted] longitudine circa ⅔ folii metientibus; fructu ———.

Near Augusta, Georgia, Sullv., (1845).

About the size and color of *Frullania Virginica*. Remarkable for the genuine papillæ on the surface of the leaves and amphigastria, for the broadly inflexed ventral margin of the leaf, and chiefly for the double row of amphigastria. These are alternate with, and equal the leaves in number. They are ⅔ as long as the leaves and less than ½ as wide, and are placed diagonally or obliquely opposite them, and about midway between their upper and lower margin. Areolation and texture of the leaves much as in *Frullania Virginica*. The rootlets are remarkably stout, and of a brown color, and few in number; and proceed from the whole under surface of the stem as well as from the base of the amphigastria. A few stems only of the plant, without fruit, were found in Mr. Sullivant's collection, mixed with *L. serpyllifolia* and *L. Sullivantiæ*. Diligent but unsuccessful search was made for more of it, among numerous specimens from the same locality.

FRULLANIA SAXICOLA, Aust. MSS., (1865.)

F. digyna; caule brevissimo arcte repente vage innovanteque pluries ramoso; foliis orbiculatis (vix obliquis) planis vel subconvexis aut nonnullo leniter concavis subassurgentibus, auriculis caulí approximatis rarissime majusculis subrotundis galeiformibusque [redacted] fere semper parvis explanatisque; amphigastriis minutis caule non [redacted] latioribus subobovatis bifidis integerrimis, sinu lobisque plerumque obtusis; perianthio compressiusculo oblongo majusculo, ore brevissimo pateriformi papuloso, dorso convexo, ventre abrupte

lateque carinato, utrinque uni—plurinervoso, carina biangulata, nervis angulisque plus minus alatis undulatisque.—*Hep. Bor. Amer. Exsic. ined.*, *No.* 104.

Closely adhering to the surface of steep shaded rocks, near Closter, New Jersey; very rare. Also, Texas, Wright in Herb. Sulliv.

Remarkable for the short, innovately much branched stems, and orbicular, plane, subascending, scarcely if at all oblique leaves, with the auricle almost always expanded into a small, oblong, concave, obtuse lamina. Areolation of the leaves distinct, scarcely enlarged in the centre at the base. Perianth longer than in *F. Virginica* and more exserted, but angled much in the same manner; however, the angles are never crested, and the "style" or mouth is very different; (tubular and considerably elongated in *F. Virginica*). The stems are much shorter, the leaves larger, and the perianth very different from *F. Eboracensis*.

FRULLANIA SULLIVANTII, Aust.

F. digyna; caule arcte adpresso vage breviter ramoso; foliis subrotundis convexis integerrimis obtusis, auricula magna galeata rotunda latitudinem folii ¼ æquante cauli adproximata; amphigastriis obovatis obtuse bifidis subintegerrimis caule parce latioribus illis versus perianthium oblongis cuneatisve, lobis obtusissimis vel supremis acutis; perianthio obovato subcompresso brevi rostrato, dorso minute 1 (—2)-nervoso, ventre unicarinato, carina biangulata bialatave; involucri foliis rotundis cum perianthio et uno alterove cum amphigastriis connatis, lobulis paralellis subæqualibus (ventrali ½—¾ angustiori).

On the bark of trees, Georgia, Sullivant; also South Carolina, Curtis (in Herb. Sulliv).

Differs from *F. inflata*, [redacted], in the fewer and less distinct nerves on the back of the much more compressed perianth, in the shorter amphigastria, in the auricle placed close to the stem, &c.; and from *F. Oakesiana* in the different perianth, smaller auricle, more unequal lobes of the involucral leaves, &c.

FRULLANIA OAKESIANA, Aust.

F. monogyna; caule vage ramoso intricato, ramulis fertilibus brevibus suberectis; foliis suboblique orbiculatis laxe imbricatis subconvexis margine leniter repandis, auriculis maximis (folia fere æquantibus) rotundatis cucullatogaleatis cauli fere contiguis, lobulo dentiformi interjecto nullo vel fere obsoleto; amphigastriis ovato-rotundis vel subobovatis caule parce latioribus bifidis integerrimis subserratisve; perianthio parvo subobovato subinflato ventre late carinato, utrinque varie numero (1—7) nervoso vel alato, cæteroquin lævi; involucri foliis bilobis integerrimis cum amphigastriis uno alterove subalte connatis, lobis æqualibus obtusis paralellis.

On the bark of *Betula excelsa*, in the region of the White Mountains of New Hampshire, Oakes.

A small species, scarcely as large as *F. Eboracensis*, and of a reddish color. Remarkable for the very large auricle (more than ½ the diameter of the leaf,) for the more or less connate involucral leaves, and for the extremely variable number of rib-like nerves of the small, subinflated perianth.

FRULLANIA BOLANDERI, Austin MSS., (1865.)

F. trigyna? caule repente inordinate fasciculatim ramoso flagelli.ero, ramis fructiferis adscendenti-erectis clavatis; foliis parvis imbricatis oblique orbiculatis convexis marginatis, basi in auriculam magnam orbiculatam galeatam compressam (subtus concavam) margine crassiusculam basi integram complicatis; amphigastriis subpatentibus minimis orbiculatis subobovatisve bifidis, lobis obtusis vel acutiusculis integerrimis vel plerumque repando-dentatis serratisve; foliis involucralibus duplo vel triplo majoribus appressiusculis cum amphigastriis alte connatis; perianthio [redacted] compresso inæqualiter triangulari obovato-elliptico, dorso concavo vel demum convexiusculo leniter bicostato versus apicem breviter et inæqualiter 2—4 nervoso, ventre obtuse unicarinato versus apicem leniter bicostato, cæteroquin lævi.

On the bark of *Negundo aceroides*, "Tomales Bay," California, Bolander, (1864).

The flagellæ are nearly erect, about as high as the fertile branches, and clothed on the underside with crowded, squarrose amphigastria, but are without leaves except at the apex, where these are crowded into little tufts or heads, and are not mixed with amphigastria.

A small species; scarcely as large as *F. Eboracensis* (which has somewhat similar flagellæ), and differing from it chiefly in the 2—4 nerves on the back of the perianth, in the involucral leaves connate with the amphigastria, and in the compressed (much as in *F. squarrosa*) auricle of the leaf.

Frullania Leana, Aust.

F. pusilla, rufo-brunnea; caule brevi——; foliis rotundato-ovatis obtusis omnino crassiusculo apiculatis, auriculis fere maximis subcylindricis obliquis a caule valde distantibus oblongo-areolatis basi dependente distincte crenulato-dentatis; amphigastriis majusculis oblongis bifidis integerrimis planis rectis caulis latitudinem parce excedentibus; perianthio e basi subattenuata obovato-oblongo multum exserto lævi dorso plano ventre unicarinato apice subtruncato, rete ad basin maximo oblongo supra medium minuto heteromorpho maxime stelliformi; involucri foliis cum amphigastriis (semper?) connatis margine sinuato-dentatis, lobulis plus minus incisis erectis paralellis, amphigastriis valde majoribus parce inciso-dentatis.

On trees near Cincinnati, Ohio, T. G. Lea (in Herb. Tayl. mixed with *Lejeunia longiflora*).

Remarkable for the very large, oblong, distant auricle, obtusely dentate at the base, and for the thickish, apiculate leaves.

A very small species, about the size of *F. Drummondii*, Tayl.; from which, however, it is readily distinguished by its more imbricated, apiculate leaves, by the much larger auricle very distant from the stem, and with a very distinct tooth-like lobe on the margin of the leaf close to its base. The perianth is also differently areolated, and the perichætal leaves are toothed on the lower lobe, or even incised.

Frullania Mauritiana, Aust.

F. tetragyna (semper?); caule bi—tripinnato flexuoso; foliis siccatis caulem subcircumvolutis madefactis patentibus e basi valde angustata oblique (subfalcato-) ovatis, apice deflexo-incurvis longiuscule acuminatis apiculatisve, rete e cellulis (marginalibus subrotundis exceptis) angustis linearibus oblongisve plus minus sinuosis in centro subhyalinis, intersticiis latissimis (quam cellulis parce latioribus) obscuris confluentibus instructo; auricula oblongo-cylindrica mediocri oblique a caule distanti; amphigastriis e basi angusta late obovatis planiusculis vel margine versus basin subrecurvis ad ⅓—¼ bifidis, sinu angusto obtuso, lobis acutis; perianthio oblongo, dorso lævi, ventre unicarinato, apice longe rostrato; foliis amphigastriisque involucralibus erectis adpressis, lobis ovato-lanceolatis inciso-serratis.

Island of Mauritius. Communicated by Prof. Chas. H. Peck.

Readily recognised by the very narrow base, acuminate apex, and narrow subsinuous cells of the subfalcate leaf; by the largish, subcylindrical, oblique auricle distant from the stem; by the nearly plane and strongly incised lobes of the involucral leaves and amphigastria. The lower margin of the leaf, between the auricle and the stem, is narrowly but distinctly inflexed; it is also furnished with a minute, cilia-like tooth, which is close to the auricle, and composed of about six roundish cellules arranged in a single row.

Frullania orbiculatis, Aust.

F. monogyna; caule lato extenso bi—tripinnatim decomposito circa 3 unciali, ramulis plus minus divaricato-recurvis; foliis laxe imbricatis majusculis oblique ovatis vel ovali-auriculæformibus convexis subpellucidis, apice

obtuso plus minus decurvis, rete e cellulis minutis subrotundis margine sinuatis, illis ad basin valde majoribus obscuris, intersticiis latis subobscuris instructo; auricula tecta cucullata valde compressa parva subovali cauli adproximata; amphigastriis magnis orbiculatis planis apice integris vel raro subemarginatis margine leniter repandis; perianthio oblongo subexserto, dorso plano convexove, ventre (carina valde compressa) unicarinato; involucri foliis semicordato-ovatis acutis integerrimis vel subundulato-repandis, lobulo longiori lineari-setaceo canaliculato, amphigastriis elongato-lanceolatis profunde bifidis subintegerrimis.

Nepal. Herb. Sulliv.

Readily distinguished from *F. integristipula*, Nees, by the fertile flower containing but a single pistil, by the orbicular amphigastria plane on the margins, by the cucullate, suboval, compressed auricle, &c.

Fossombronia Cristula, Aust.

F. minuta, albescens; caule perbrevi (1—2 lineas longo) arcte repenti furcatim vel fastigiatim diviso, radicibus plerumque purpureis terræ affixo; foliis angulariter lobulatis subintegrisve quadratis vel obovato-rotundis subdifformibus plerumque basi subangustatis atque apice valde undulato-crispatis; perianthio fere ut in *F. pusilla*; involucro nullo? capsula in pedicello brevissimo immersa; sporis pallido-fuscis parce subgrosseque tuberculatis circa 1-600—1-700 unc. metientibus; elateribus delicatissimis hyalinis unicellularibus brevibus crassiusculis plus minus difformibus, fibro tenuissimo pallido-fusco annulari et spirali (*plerumque partim annulari ac partim spirali*) depictis.—*Hep. Bor. Amer. Exsic. ined., No.* 121.

On damp sand, associated with *Dicranum cerviculatum* and *Jungermannia crenulata*, in an unfrequented path, near Batsto, New Jersey, (Oct., 1868).

Remarkable for its small size, and very delicate, often somewhat branched elaters of more or less variable shapes (much as in the *Anthoceroteæ*), and with the *single* fibre usually partly annular and partly spiral in the same example! Antheridia few and large, oval or roundish obovate, nearly sessile on the back of the stem. Pistillidia (about 20) somewhat crowded towards the apex of the stem, above the antheridia, and just below the perianth, and partially immersed in the stem; not involucrate, or very imperfectly so.

Androcryphia longiseta.

Fossombronia longiseta, Austin, MSS, 1864.

A. dioica; caule suberecto vel depresso 3—4 lin. longo e dorso proliferoramoso, radicibus purpureis ~~crebre ciliatis~~; foliis pallidis subimbricatis subhorizontalibus subquadratis lobis plerumque obtusis undulato-lobulatis subintegrisve inferioribus nonnullis parvis, involucralibus plerumque valde majoribus subflabelliformibus basi nonnullo attenuatis ~~et~~ in tubulum cum caulis apice confluentibus; perianthio plerumque magno campanulato varie ~~fisso~~ inciso vel subintegro; pedicello longiusculo (4—6 lin. alt.) tenui basi in caulis apice longe incluso; capsula irregulariter lacera magna calyptram (et nonnullo perianthium) implente; sporis subangularibus subnigris valde muricatis; elateribus longiusculis bispiris.

On the ground among mosses. California, Bolander; Texas, Wright.

A variable species. The perianth often smallish, but frequently very large; sometimes divided to the base into 2—3 flabelliform divisions and again nearly entire, the smaller ones undulate and crisped at the mouth, the larger ones often nearly entire and nearly plane at the mouth. The upper leaves are more or less involucrate, with their bases often costa-form, and more or less united into a tube and confluent into the stem. Pistillidia quite numerous, at first naked and scattered on the back of the stem (as in *Fossombronia*). Stem frequently bearing a descending tuber underneath the perianth, and usually considerably extending beyond it. On the prostrate stems the leaves are often

broader than long, and subhorizontal; on the ascending ones they are more or less attenuated and 1—3 costate at the base, and erect or nearly so. In length the style is 1½ times, and the elaters 3—5 times, the diameter of a spore. Spores with more numerous and larger muriculæ than in *Fossombronia pusilla*.

Separated from *Fossombronia* chiefly by its dioicious inflorescence, and by the perianth being (apparently at least) an expansion of the apex of the stem.

PLAGIOCHASMA ERYTHROSPERMA, Sull., in Herb.

P. fronde expanso-obovata (3—5 lin. lat.) pallido-viridi rugulosa late fuscescente marginata, subtus dense radiculosa squamosaque; squamis albidis setaceo-incisis versus apicem ultra marginem exstantibus; pedunculo 5—8 lineas alto basi nudo apice paleaceo; sporis aurantiaceo-rubris tuberculatis; elateribus 4-spiris.

Rocky Mountains, E. Hall.

Remarkable for the red spores, and for the white, fringe-like scales extending beyond the margin of the frond towards the apex.

SAUTERIA LIMBATA.

? *Grimaldia limbata*, Austin, MSS., 1865.

S. fronde obovato-oblonga subdichotoma concava reticulato-papulosa læte viridi latissime marginata, subtus nigro-purpurea valde incrassata, margine nigro-purpureo membranacea subplicata undulato-crenata involuto-incurva; squamis arcte imbricatis sanguineo-purpureis, inferioribus amplis obliquis bicornibus nodoso-dentatis juxta marginem positis, superioribus majoribus lanceolatis attenuatis frondis marginem superantibus incurvis; pedunculo subunciali pallido nudo; receptaculo femineo 1—3-carpo, subtus multum sed breviter paleaceo.

Under wet rocks. California, Bolander. (No. 4619.)

Remarkable for the broad, wavy, dark purple, membranaceous margin of the frond. The scales towards the apex of the frond increase in size and become abruptly two-horned; these horns (laciniæ) are very long and narrow, and extend beyond the margin of the frond as a strongly inflexed fringe; the very apical ones are triangular-subulate or setaceous, bifid or entire, and extend still farther beyond the margin of the frond, and in the fertile plant they become (by age) whitish. Pedicel sulcate, naked at the base. Receptacle very obtuse (1-fruited in our meagre specimen).

? SAUTERIA CRASSIPES, Aust.

? S. fronde obcordata subcuneatave bifida fuscescente-purpurea vel viridi supra subpapuloso-reticulata minutissime porosa, squamis ventralibus purpureis apicem superantibus; pedunculo breviusculo (6—8 lin. alto) parcissime paleaceo, circa basin nudo vel parce barbato-involucrato, versus apicem incrassato; receptaculo femineo 4—7 inciso-lobato, subtus quoque eodem numero carpo brevissime submultumque paleaceo; capsula firmiuscula distincte pedicellata; elateribus tri(—quadri?)-spiris (magis immaturis).

Japan, on hillsides. Com. Rodgers, N. Pac. Expl. Exped.

I have doubtfully referred this species to *Sauteria*. It resembles *Preissia* very much,—also, in some respects, *Duvalia*. It is remarkable for the pedicel being much thickened towards the apex. There are occasionally a few scale-like palea on the peduncle, and a few filamentose scales or hairs on the frond about its base. Involucre rather large, somewhat flattish, fuscous-green tinged with purple, and it bears as many capsules, underneath around the margin, as there are lobes. On account of the immature state of the specimens, it is not possible to tell in what manner the capsule ruptures.

? DUVALIA INTERMEDIA, Aust.

? D. fronde parviuscula obcordata subcuneatave subbifida concava (2—4 lin. longa 1—2 lin. lata) laxe texta crassiuscula anguste albido-submarginata

vesiculoso-striolata in ætate valde fovelata, subtus plus minus purpurea et squamigerula, squamis purpureis margine non attingentibus; pedunculo frondi continuo longiusculo nigro-purpureo, basi apiceque multum ac toto longitudine parcissime albo-paleaceo; involucro hemisphærico, apice papuloso-cavernoso; capsula sessili vel brevissime pedicellata supra medium deoperculata; sporis flavis tuberculatis subpellucido cinctis; elateribus bispiris.

On dry hills. Com. Rodgers, N. Pac. Expl. Exped.

The general appearance of the peduncle and of the involucre is that of a *Grimaldia*, but the loose texture of the involucre and of the frond are as in *Duvalia*, and it is difficult to decide to which of these, probably too closely allied genera, our plant belongs.

Fimbriaria Bolanderi, Austin, MSS. 1865.

F. fronde anguste lineari (1½—2 lin. lata, 6—10 lin. longa) solida indistincte porosa cineraceo-viridi depresso-canaliculata, subtus carinato incrassata nigro-purpurea squamosa, margine membranacea albido-pellucida vel purpurea undulato-crenata siccate arcte convoluta; squamis saturate purpureis marginem non attingentibus; fructu ex innovationis apice laterali, pedunculo tenuissimo pollicari vel sesquipollicari pallido-purpureo versus basin parcissime piloso, receptaculo femineo parvo tetracarpo subconico siccate subdepresso apice umbonnato subverrucoso, perianthiis subradiatis subglobosis subdecemfidis albidis apice cohærentibus.

Innovationes e ventre versus basin frondis [redacted], brevissimæ (1½—2 lin. longæ), subclavatæ, subtus dense squamosæ radiculosæque, apice dilatato—emarginato-bilobæ: plerumque masculares (vel steriles?). Elateres tri—quadrispiri. Sporæ fuscæ, papilloso-reticulatæ, margine pellucida cinctæ.

San Rafael, California. Dr. H. N. Bolander, 1865.

A small species, about the size of *F. pilosa*, Tayl. Remarkable for the numerous ventral innovations, which bear the fruit and male flowers. *F. schinella*, Gottsche de Mex. Leverm., p. 271 (*F. violacea*, Austin, MSS. 1866), [redacted] Dr. Bolander [redacted] in California, appears to be the only other known species having this peculiar character.

Fimbriaria vesiculosa, Aust.

F. fronde carnosa vesiculosa incrassata subpalmatim vel furcatim lobata, supra subelevato-papulosa eporosa, laciniis subobovatis madefactis margine erecto-appressis vel subinvolutis; squamis fusco-purpureis versus apicem margines excedentibus; pedunculis singulis vel binis circa ½-uncialibus robustis pluries canaliculato-striatis fere nudis, basi non involucratis; receptaculo femineo depresso-hemisphærico vesiculoso 3—6 (et ultra) -carpo; perianthiis brevisaculis subovatis tenuissimis albidis subsex—octofidis, laciniis subconcretis; capsula subglobosa operculo subfusco crassiusculo depresso instructa; sporis luteis grosse tuberculatis; elateribus trispiris.

Japan. Com. Rodgers, N. Pac. Expl. Exped.

Remarkable for the thick vesiculose frond, with the margins more strongly erect or involute when moist than when dry! (in fact, when moistened it is with difficulty that the frond can be flattened out); also for the about six-fruited, flattish, fertile receptacle, and very delicate perianths, which sometimes burst through its upper surface.

Anthoceros scariosus, Aust.

Fronde pallido-viridi lacunoso-striata sublamellatave, laciniis flabelliformibus margine crenato-denticulatis lobatisve; involucro pallide cylindrico subclavatove 1—1½ lineas longo longitudinaliter lamellato-striato, ore exacte truncato subcontracto latissime scarioso; pedunculo brevi; capsula subunciali; sporis nigris scaberrimis: (elateres sine fibra spirali.)

In grassy lawns, South Carolina, Ravenal.

Remarkable for the somewhat lamellated surface of the frond and involucre; the latter with a very broad, abrupt, subcontracted, scarious margin, which usually forms nearly half its length.

CRYPTOCARPUS, (gen. nov.) Aust. MSS., 1864.

Frons laxe spongioso-reticulata, irregulariter subpalmatim lobata, tenuis, epidermide haud distincta. Costa nulla. Radices intus [redacted] (ut in *Sphærocarpo*), longissimi, intertexti. Fructus in frondis substantia immersus (ut in *Riccia*). Sporangia depresso-globosa, singulatim nata, non libera. Calyptra stylo nigro persistente coronata. Sporæ 4-jugæ (ut in *Sphærocarpo*), (vix solutæ) in aspectu singulæ et profunde quadrilobæ.

A genus intermediate between *Riccia* and *Sphærocarpus*, having the characters of vegetation and spores of the latter, while the fruit is immersed in the frond as in the former genus. Represented by a single species, which occurs both in the Southern States and in France.

CRYPTOCARPUS CURTISII, Aust. MSS., 1864.
Riccia Curtisii, James, in Herb. (fide Curtis).

Fronde caespitosa valde imbricata fibroso-papulata, laciniis inciso-lobulatis margine crenatis; sporangiis maximis in statu siccato latentibus [redacted] apparentibus; sporis fusco-nigris valde muricatis.

On moist ground, South Carolina, Ravenel (in Herb. Sulliv., 1849). North Carolina, Curtis (l. c., 1853). "Montand après Marseille" (Herb. Lanning, "ex Herb. Torrey").

To the naked eye the dried specimens look like little heaps of some filamentose conferva. In this state the frond is very brittle, and, on account of its loose texture, appears to be deeply pitted and fibrose and papulose above. Upon moistening the specimens the fronds become tough (much as in the *Anthoceroteæ*), the upper surface looses its pitted appearance, and the interstices (apparent fibres) between the large cells close up; and the fruit, which was completely hidden before, now appears as a black spot in the substance of the frond. Upon re-drying the specimens the fronds become much thinner than they were at first, and the fruit remains visible, protruding from the upper surface. The frond is larger than in *Sphærocarpus Micheliï*, from the Southern States, but lobed and reticulated in the same manner. The extreme apices of the lobes are often suddenly contracted and subsolid (much as is often seen in the *Anthoceroteæ*.) The base of the divisions are contracted and subsolid, and the rootlets are smooth on the interior surface as in *Sphærocarpus*. The divisions are flabelliform, and palmately or incised-lobed, and lie so closely over one another as to be separated with difficulty, the upper ones, by their numerous long rootlets, knitting firmly to the pitted surface of those immediately beneath them. The lobes are crenate and obtuse, not emarginate, extremely thin and hyaline. Spores firmly united in fours into a sort of *coccus* which is deeply 4-lobed, and very beautiful under the lens,—more deeply lobed than in *Sphærocarpus terrestris* and more finely reticulated and papillose. [From narrowed places in the divisions (as it were sinuses) there appears to arise young plants, folded over on the back of the parent frond in such a manner that they seem to arise out of its back near the margin. Whether this is really the case, or only apparent, can only be determined by fresh specimens.]

RICCIA ALBIDA, Sulliv., in Herb., 1853.

R. fronde solida albida alternatim bifurcatimve divisa; lobis (½—¾ lin. lat.) oblongis creberrimis angusto profundeque sulcatis, apice rotundatis subemarginatis, subtus subsquamosis valde radiculosis; epidermide superiore (nisi in canalis fundo) spongioso-papulosa profunde foveolata quam frondis substantia crassiori; fructu ignoto.

Texas, Dr. Charles Wright.

This species is remarkable for its thick, spongy epidermis of a whitish color, much as in *R. bullosa*, Link.; but that is a much larger species, with the lobes of the frond not so much crowded, and with the upper surface rugulose.

RICCIA ARVENSIS, Aust. MSS., 1863.

R. fronde solida subciliata incrassata orbiculari subradiatim pluries divisa subgregario-imbricata in diametro 4—8 lineari, supra papuloso-reticulata obscure viridi vel demum secus margines purpurea, subtus nuda vel obsolete squamosa valde obtuseque carinato-incrassata ob sporangia tumentia valde nodosa; lobis obtusiusculis obsolete emarginatis lineari-ellipticis vel fere linearibus dichotomis versus apicem incrassatem leniter dilatatis, apice in statu juniori subadscendentibus vix canaliculatis, in ætate horizontalibus subcompresso-acuminatis evidentius lateque sulcatis, margine planis acutis (in adspectu incrassatis obtusisque); ciliis albidis brevissimis omnino inconspicuis subobsoletisve; fructibus primum versus apicem loborum infra canalem agregatis, sporis angularibus fusco-atris reticulato-muricatis—*Hep. Bor. Amer. Exsic. ined.*, *No.* 141.

Var *β*, hirta. Statura majora, fronde subtus magis purpurea et squamigerula margine evidentius ciliata, supra omnino hirta.—*Hep. Bor. Amer. Exsic. ined.*, *No.* 142.—*R. hirta*, Aust. MSS. 1864.

On damp ground in cultivated fields and (the var.) in rocky places about Closter, New Jersey, common.

The canal occupies about ½ of the upper surface of the frond, and has a plane or slightly convex bottom with abrupt sides. That portion of the frond between the canal and the acute margin is slightly convex above *as if thickened*. The typical form appears to be near *R. paradoxa*, De Not., but that is described as being a smaller species, and the spores are said to be light-red. The var. differs from *R. cilifera*, Link., in the fronds being purple and more or less scale-bearing underneath, and not membranaceous on the margin. The sporangia are placed rather towards the apex of the lobes as in *R. palmata*, Lindbg.; which appears to be a larger species, with the lobes of the frond concave-canaliculate above, &c., and seems to be intermediate between this and the following species:

RICCIA LESQUEREUXIANA, Aust. MSS., 1863.

R. fronde solida subciliata orbiculata stellatim vel subcruciatim divisa incrassata, supra punctato-reticulata glauco vel cinereaceo-viridi epidermide macula purpurea supra fructum notata, subtus nuda concolore vel demum purpurascente; laciniis bilobis vel di-trichotomis obcordatis lineari-cuneatisve (2—5 lin. longis 1—2 lin. latis) leniter concavo-canaliculatis, apice emarginatis brevi sulcatis, margine hirsuto-ciliatis incrassatis obtusis subadscendentibus ad apicem subinvolutis; ciliis creberrimis brevibus albidis obtusis in statu juniori subobsoletis; fructibus sparsis non seriatis subbasilaribus, sporis fusco-atris angularibus reticulatis: gemmis? numerosis ellipticis aterrimis in frondis facie superiori versus loborum apicem positis quam sporis triplo minoribus.—*Hep. Bor. Amer. Exsic. ined.*, *N.* 143.

Var. *α*, cruciata. Fronde cruciatim parce divisa, laciniis ciliisque brevissimis.

Var. *β*, trichotoma. Fronde magis divisa, laciniis ciliisque longioribus.

The var *α* occurs almost exclusively on damp ground in cultivated fields; the var. *β* on rocky soil, associated with the var. of the preceding species, and with *R. sorocarpa* and *R. lamellosa*.

R. palmata, Lindbg., a closely related species, is described as having the frond palmately lobed and the divisions broadly sulcate, with the cilia arranged in a single series. *R. Bischoffii*, Huben., has the margin of the frond membranaceous, the lobes much expanded, and spores twice as large! The var. *α* has much the appearance of *R. bifurca*, Hoffm., as figured in Lindbg. Monogr. d. Ricc. T. XX, f. 1, but that has the margin of the frond naked.

RICCIA SULLIVANTII, Austin MSS., 1863.

R. terrestris, velutina, valde cavernosa, fulgida, luteo-viridis; fronde orbiculari cellulose-succulenta radiatim pluries divisa diametro subsemipollicari; laciniis di-trichotomis linearibus (vel in statu juniori subcuneatis) subimbricatis canaliculatis, apice tenuiori angustiori emarginatis, subtus carinato-incrassatis concoloribus nudis (vel ut in *R. fluitante* ob epidermidem evanidam ad apices minute squamigerulis), margine undique tenuibus subhyalinis crispato-undulatis cum serie cellularum singularum hyalinarum circumdatis crenulatisque in statu siccato omnino adscendentibus ad apicemque suberectis, carina cavernoso-striata copiose radiculosa ob sporangia subtus tumenti; fructibus copiosissimis e frondis pagina superiori prorumpentibus; sporangiis supra non prominentibus in carina immersis singulatim natis stylo longo nigro coronatis, sporis obscure angularibus reticulatis submuricatis luteo-fuscis vel nigris.—*Hep. Bor. Amer. Exsic. ined.*, *No.* 147.—*R. crystallina*, Sulliv. Mosses of the U. S. p. 84. pro parte.

On damp or wet ground, in fields and meadows, about Closter, New Jersey; also Pennsylvania, Lesquereux.

R. Sullivantii resembles both small forms of *R crystallina* and terrestrial forms of *R. fluitans*, Linn., but the former is distinguished by its less divided frond with the divisions plane above and expanded towards the apex; and the latter by its divaricate lobes somewhat thickened at the apex, by its fewer and smaller air-cavities, and by its sporangia rupturing [redacted] the frond, as well as by its shorter style and smoother spores.

[There are occasional found, imbedded in largish cavities on the under side of the frond, a bundle of rootlets, matted or coiled together. These rootlets are apparently longer than those which fix the plants to the earth, and have the interior surface papillose (a character common to the rootlets of all *Ricciæ*). Their free end is much expanded and open at the extremity, and towards this extremity they are filled with cubical green bodies, arranged (mostly) in fours, and resembling the spores of a *Conferva*. What these bodies are is doubtful; it is barely possible that they are a sort of reproductive organ belonging to the plant in whose tube-like rootlets they occur.]

RICCIA TENUIS, Aust.

R. fronde tenuissima valde cavernosa fibroso-nervosa saturate vel olivacto-viridi fulgida parce divisa, subtus parcissime squamosa concolore, squamis albidis tenuissimis ligulatis; laciniis rotundo-obovatis (2—4 lin. long. 1½—3 lin. lat.) planis, margine sinuato-undulatis, subtus ob costam tenuem anguste carinatis; [redacted] radicibus parcissimis tenuissimis [redacted]; fructibus in nervo sitis, sporangiis parvis depresso-globosis plerumque 2—4 aggregatis in frondis pagina inferiori protuberantibus sed e neutra prorumpentibus, calyptra tenuissima laxissime texta frondis substantiam arcte adhærenti stylo brevissimo apice præmorso (non dilatato) coronata, sporis parvis globosis vel subovalibus fuscis valde echinaceo-muricatis.—*Hep. Bor. Amer. Exsic. ined.*, *No.* 150.

On wet, broken ground in open woods, near Closter, New Jersey; also near Lawrence, N. J., James.

The closely allied *R membranacea*, L. & G., differs in the *sub*-cavernous frond with the lobes suddenly widened and subsulcate towards the apex, in the oblong-rotund sporangia, and longer style dilated at the apex. *R. nigrescens*, Mont., is doubtless also very near our plant, but the margins of the frond are said to be ascending,—furthermore, the description is altogether too meagre.

RICCIA NATANS, Linn.

The spores of this species vegetate upon mud in summer, and by autumn the young plants become considerably developed: (vide Aust. Hep. Exsic. ined. N. 144, B.; also Lindbg. Monogr. d. Ricc. t. 26, f. 1, under the name of *R.*

lutescens.) They are suborbicular in outline, lobed and rooting underneath, as in the true terrestrial species. They also have rudimentary scales at the apices of the lobes underneath. These fronds become immersed by the autumn rains, and during the winter the apices of the lobes thicken and expand greatly. These apices being destitute of rootlets and extremely buoyant, gradually assume a vertical position in the bottom of the pool, and at length (in the spring) become detached and rise to the surface of the water, (where they float in a horizontal position,) often carrying with them portions of the effete base of the frond. In the meantime the scales develop into long purple fringes. *These floating apices alone constitute the L. natans of Linnæus and authors*: (vide Aust. Hep. Exsic. N. 144, A.; also Lindbg. Monogr., p. 115, t. 21 and 32; etc.) They fruit copiously in the vicinity of Albany, N. Y., in the months of May and June (Prof. C. H. Peck). Sometimes the autumn fronds do not become immersed, in this case they remain whole; again the fertile fronds are often left upon the mud by the dessication of the pool in summer; in this case they are plainly continuous from the apex: (vide Hep. Exsic. N. 145; also Herb. Tayl. (*in part*), *under the name of* "*Riccia velutina.—N. Amer. Drummond.*"

RICCIA LUTESCENS, Schweinitz.

A single frond only of this species was found by me in Sept. 1858, at Closter, N. J. This frond contained a single sporangium! which is about as in *R. crystallina*. The spores are also as in that species. During the past eight years I have not only watched this plant in all the stages of its growth, from the time of its first appearance in the month of June, until its final disappearance in winter, but have collected many specimens of it in the mature state. I have also received numerous specimens of it from many localities, from New England to Canada and Missouri; but not a single one of these specimens shows any trace either of fruit or other kind of reproductive organ whatever! and it is still a mystery how the plant reproduces itself. The young plants make their appearance in great profusion, in the bottoms of exsiccated ditches, &c., in the beginning of summer. These rapidly develop into the sterile plant, which has been most accurately described and figured by Mr. Sullivant: (*Mem. Amer. Acad. Arts & Sci.* (Boston) 4, p. 176, t. 4.) No rootlets are produced underneath the frond above the middle; and as the ditches become filled with water late in autumn, the fragile laciniæ break asunder near the middle, in consequence of the extreme buoyancy of their apices. The detached pieces (or apices) rise to the surface of the water, where they remain suspended in an oblique position (the extreme apex only reaching the surface), until they become frozen up in the ice. Upon the ice disappearing in the spring, no trace of any portion of the plant is to be found!